

Chapter NR 720

SOIL CLEANUP STANDARDS

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Note: Corrections made under s. 13.93 (2m) (b) 7., Stats., Register, January, 2001, No. 541.

NR 720.01 Purpose. The purpose of this chapter is to establish soil cleanup standards, for the remediation of soil contamination, which result in restoration of the environment to the extent practicable, minimize harmful effects to the air, lands and waters of the state and are protective of public health, safety, or welfare or the environment as required by ch. 292, Stats., and which are consistent with ch. 160, Stats., and ch. NR 140. This chapter is adopted pursuant to ss. 227.11 (2) and 289.06 (1) and (2), Stats., and ch. 292, Stats.

History: Cr. Register, March, 1995, No. 471, eff. 4-1-95; am., Register, February, 1996, No. 482, eff. 3-1-96; CR 12-023; am. Register October 2013 No. 694, eff. 11-1-13.

NR 720.02 Applicability. (1) This chapter applies to all remedial actions taken by responsible parties to address soil contamination after an investigation has been conducted at a site, facility or portion of a site or facility that is subject to regulation under ch. 292, Stats., regardless of whether there is direct involvement or oversight by the department. This chapter also applies to soil contamination at all of the following:

(a) Solid waste facilities, where remedial action is required by the department pursuant to ch. NR 508.

Note: Chapter NR 720 does not apply to landspreading regulated under ch. NR 518 or solid waste facilities where ongoing operations are occurring, unless remedial action is required pursuant to ch. NR 508.

(b) Hazardous waste facilities, where the owner or operator is required to close the facility pursuant to s. 291.29, Stats., or subchs. G and H of ch. NR 664, or to institute corrective action pursuant to s. 291.37, Stats., or s. NR 664.0100. However, if U.S. EPA requires that states employ soil cleanup standards for hazardous waste facilities that are more stringent than the standards in this chapter, the department is obligated under the state's hazardous waste management act, ch. 291, Stats., and its hazardous waste program RCRA authorization to apply the more stringent soil cleanup standards.

Note: Section NR 600.07 no longer exists.

(c) Wastewater lagoons, storage structures and treatment structures that are abandoned pursuant to s. NR 110.09, 213.07 or 214.08.

Note: Chapter NR 720 applies to abandonment of lagoons, storage structures and treatment structures for sewage treatment facilities projects; abandonment of lagoons, storage structures and treatment structures that receive wastewaters, associated sludges, by-product solids and any resulting leachates from industrial, commercial or agricultural sources, except as provided in s. NR 213.02 (2); and abandonment of land treatment systems for industrial liquid wastes, by-product solids and sludges, except as provided in s. NR 214.02 (3). Chapter NR 720 does not apply to activities regulated under s. 281.48, Stats., or permitted activities regulated under 40 CFR 503 or ch. NR 204, 206 or 214, including permitted land spreading of sludge or land disposal of wastewaters from municipal and domestic wastewater treatment works and permitted land treatment of industrial liquid wastes, by-product solids and sludges.

(d) Sites where remedial action is being taken by a person who is seeking the liability exemption under s. 292.15, Stats.

(e) Sites with PCB contamination.

Note: U.S. EPA has independent authority to regulate soil contamination from PCB's under the toxic substances control act. The department and EPA have entered into an MOA that specifies how responsibility for these types of sites will be determined. The MOA can be found at: <http://dnr.wi.gov/files/pdf/pubs/tr/r786.pdf>.

(2) This chapter applies to interim actions taken by responsible parties or other persons under s. 292.15, Stats., when at the

completion of both the site investigation and interim action taken to address contaminated soil, the responsible parties or persons taking action under s. 292.15, Stats., request that the site or facility be closed out in accordance with ch. NR 726, without taking a subsequent remedial action to address the contaminated soil.

(3) This chapter applies to remedial actions taken by the department where a department-funded response action is being taken under the authority of ch. 292, Stats.

(4) Concentrations of legally applied pesticides are exempt from the requirements of this chapter when all of the following conditions are met:

- (a) The application of the pesticide was done in compliance with:
 1. The pesticide label currently registered with the U.S. EPA;
 2. Sections 94.67 to 94.71, Stats.; and
 3. Rules adopted under ss. 94.67 to 94.71, Stats.

(b) For pesticides that are intended to be applied to the soil, pesticide concentrations exceeding soil cleanup standards are only found in the surface soil layer, where the pesticide is expected to perform its intended purpose, and only at concentrations that would be expected from pesticide application, in compliance with the pesticide label requirements.

Note: The depth of the surface layer of soil will vary depending on the type of pesticide applied and the appropriate intended use of that pesticide.

(5) The department may exercise enforcement discretion on a case-by-case basis and choose to regulate a site, facility or a portion of a site or facility under only one of a number of potentially applicable statutory authorities. However, where overlapping restrictions or requirements apply, the more restrictive control. The department shall, after receipt of a request from a responsible party, provide a letter that indicates which regulatory program or programs the department considers to be applicable.

Note: Sites, facilities or portions of a site or facility that are subject to regulation under ch. 292, Stats., may also be subject to regulation under other statutes, including solid waste statutes, ch. 289, Stats., or the hazardous waste management act, ch. 291, Stats., and the administrative rules adopted pursuant to those statutes. One portion of a site or facility may be regulated under a different statutory authority than other portions of that site or facility. When necessary, the department will, to the best of its ability, facilitate coordination between the regulatory programs involved.

(6) The department may take any action within the context of regulatory programs established in statutes or rules outside this chapter, if those actions are necessary to protect public health, welfare, or safety or prevent a damaging effect on the environment for present and future uses, whether or not a soil cleanup standard has been adopted under this chapter.

(7) Nothing in this chapter authorizes an impact on soil quality that would cause a violation of a groundwater quality standard contained in ch. NR 140, an impact on soil quality or groundwater quality that would cause a violation of a surface water quality standard contained in chs. NR 102 to 106 or an impact on soil quality that would cause a violation of an air quality standard contained in chs. NR 400 to 499.

History: Cr. Register, March, 1995, No. 471, eff. 4-1-95; cr. (1) (d), am. (2); Register, February, 1996, No. 482, eff. 3-1-96; emerg. am. (1) (intro.), cr. (1m), eff. 5-18-00; am. (1) (intro.), cr. (1m), Register, January, 2001, No. 541, eff. 2-1-01; corrections in (1) (b) made under s. 13.93 (2m) (b) 7., Stats., Register September 2007

No. 621; CR 12-023: am. (1) (intro.), (a), (b), cr. (1) (e), r. (1m), am. (3), Register October 2013 No. 694, eff. 11-1-13.

NR 720.03 Definitions. In this chapter:

(1) "Aquifer" means a saturated subsurface geological formation of rock or soil.

(1m) "Ceiling limit concentration" means a preset non-risk based concentration of an inorganic or semi-volatile chemical.

Note: This definition is consistent with the approach used in the U.S. EPA's Regional Screening Table which sets a ceiling limit concentration of 100,000 mg/kg or 10% by weight for a relatively non-toxic chemical in a soil sample. This definition is not the same as in other natural resources administrative rules. For example, the term ceiling limit in ch. NR 204 refers to the concentration of certain metals in domestic sludge that if exceeded would result in the sludge not being eligible for land application.

(2) "Contaminant of concern" means a hazardous substance that is present at a site or facility in such concentrations that the contaminant poses an actual or potential threat to human health, safety or welfare or the environment based upon:

(a) The toxicological characteristics of the hazardous substance that influence its ability to adversely affect human health or the environment relative to the concentration of the hazardous substance at the site or facility;

(b) The chemical and physical characteristics of the hazardous substance which govern its tendency to persist in the environment and the chemical, physical and biological characteristics at the site or facility which govern the tendency for the hazardous substance to persist at the site or facility;

(c) The chemical and physical characteristics of the hazardous substance which govern its tendency to move into and through environmental media;

(d) The naturally occurring background concentrations of the hazardous substance;

(e) The thoroughness of the testing for the hazardous substance at the site or facility;

(f) The frequency that the hazardous substance has been detected at the site or facility; and

(g) Degradation by-products of the hazardous substance.

(3) "Cumulative excess cancer risk" means the upper bound on the estimated excess cancer risk associated with exposure to multiple hazardous substances or multiple exposure pathways.

(3m) "Dermal absorption" means systemic exposure via skin absorption. However, because dermal toxicity factors are not available, oral-to-dermal extrapolation is done by adjusting for gastrointestinal absorption in order to derive toxicity values in terms of a dermally-absorbed dose.

Note: Dermal toxicity values that are extrapolated from oral toxicity values may not take into account allergic contact responses or skin cancer.

(4) "Direct contact" means human exposure to substances in soil through one or more of the following pathways: inhalation of particulate matter, dermal absorption, incidental ingestion, or inhalation of vapors from the soil.

(5) "Hazard index" means the sum of 2 or more hazard quotients for multiple hazardous substances or multiple exposure pathways.

(6) "Hazard quotient" means the ratio of the exposure of a single hazardous substance over a specified time period to a reference dose, or reference concentration where appropriate, for that hazardous substance derived for a similar exposure period.

Note: Hazard quotients and hazard indices are measures of the potential for non-carcinogenic effects.

(7) "Incidental ingestion of soil" means ingestion of soil by humans as a result of normal hand-to-mouth behaviors.

(8) "Inhalation of particulate matter" means inhalation by humans of contaminants adsorbed to respirable soil particles less than 10 microns in diameter.

(9m) "Inhalation of vapors" means inhalation by humans of soil contaminants that volatilized into outdoor air.

(11) "Pathway" means the route a substance takes in traveling to a receptor or potential receptor or the specific portal of entry, such as

lungs, skin or digestive tract, the substance takes to potentially express its toxic effect, or both.

Note: An example of the food chain pathway is when a substance is taken up from soil to plant tissue and the plant tissue is then ingested by a person.

(12m) "Performance standard" means a remedial action or, in some cases existing site conditions that prevent exposure to contaminants or will result in a decrease in contaminant concentrations, or both.

(13) "Restricted access areas" means land immediately adjacent to highways or railroad right-of-ways, where the presence of structural controls, such as fencing, has eliminated pedestrian ingress by the public.

(14) "Risk" means the probability that a hazardous substance, when released to the environment, will cause carcinogenic effects in exposed humans or other biological receptors.

(15) "Soil cleanup standard" means either a residual contaminant level determined in accordance with ss. NR 720.10 or 720.12, or a soil performance standard determined in accordance with s. NR 720.08.

(16) "Soil saturation concentration" or "Csat" means the contaminant concentration in soil at which the absorptive limits of the soil particles, the solubility limits of the soil particles, the solubility limits of the soil pore-water, and saturation of soil pore-air have been reached. At concentrations greater than Csat, the soil contaminant may be present in free phase for contaminants that are liquid at ambient soil temperatures and pure solid phases for compounds that are solid at ambient soil temperatures.

History: Cr. Register, March, 1995, No. 471, eff. 4-1-95; corrections in (12) (c) made under s. 13.93 (2m) (b) 7., Stats., Register September 2007 No. 621; CR 12-023: cr. (1m), (3m), am. (4), (8), r. (9), cr. (9m), r. (10), (12), cr. (12m), am. (14), cr. (15), (16) Register October 2013 No. 694, eff. 11-1-13.

NR 720.05 General. (1) **REMEDIAL ACTION.** Responsible parties shall select and implement a remedial action to address soil contamination when, after any of the following investigations has been completed, information collected during the investigation indicates that a remedial action to address soil contamination is necessary to achieve compliance with the requirements of this chapter:

(a) Site investigation report developed in accordance with ch. NR 716 at sites or facilities subject to regulation under s. 292.11 or 292.31, Stats.

(b) Solid waste site investigation report prepared in accordance with the requirements of ch. NR 508.

(c) Investigation done under a hazardous waste closure plan or a RCRA facility investigation report, developed in accordance with the requirements of subchs. G and H of ch. NR 664 or s. NR 664.0100.

(d) Investigation done under a wastewater facility, structure or system abandonment plan developed in accordance with the requirements of s. NR 110.09 (2) (r), 213.07 or 214.08.

Note: Remedial actions at some types of sites or facilities, such as the abandonment of wastewater lagoons, may only have to comply with ch. NR 720 and not other requirements in the NR 700 series, such as the minimum site investigation requirements in ch. NR 716. In this case, the department or responsible parties may choose to use the other chapters of the NR 700 rule series as guidance for complying with ch. NR 720.

(2) **RESIDUAL CONTAMINANT LEVELS OR PERFORMANCE STANDARDS.** Remedial actions conducted by responsible parties to address soil contamination shall be designed and implemented to restore the contaminated soil to levels that, at a minimum, meet the residual contaminant levels or performance standards for the site or facility determined in accordance with this chapter.

(3) **NO FURTHER ACTION.** If all soil contaminant concentrations meet applicable residual contaminant levels or performance standards after a remedial action is completed, the department may not require further remedial action for soils, unless the department determines that the residual soil contamination:

(a) Presents a threat to public health, safety, or welfare or the environment at the site or facility;

(b) Will cause a violation of a groundwater quality standard contained in ch. NR 140;

(c) Will cause a violation of a surface water quality standard contained in chs. NR 102 to 106; or

(d) Will cause a violation of an air quality standard contained in chs. NR 400 to 499.

(4) SUBMITTALS. (a) Unless otherwise directed by the department, submittals under this chapter shall be included in the site investigation report or the draft remedial action options report required under s. NR 700.11 (1).

(b) Submittals to the department under this chapter shall include all of the following:

1. Complete background information and supporting documentation for the procedure to be used.
2. Documentation that the application of the procedure is valid for the site or facility under consideration.
3. Necessary data and documentation needed to fully evaluate the submittal.
4. Legible copies of source documents or pertinent portions of source documents.

Note: In order to facilitate department review of submittals, legible copies of entire source documents or the pertinent portions of source documents sufficient to evaluate the method or procedure used should be included with the submittal.

(5) LAND USE CLASSIFICATION. (a) Responsible parties shall identify the current land use and zoning for the site or facility by the time the remedial action is selected, unless otherwise directed by the department.

(b) Responsible parties shall classify the land use of a site or facility as industrial if all of the following criteria are met:

1. The site or facility is currently zoned for, or otherwise officially designated for, industrial use.

Note: Typically, a site or facility is officially designated for industrial use by the issuance of a conditional use or special exception permit that allows an industrial use of that site or facility in a non-industrial zoning district or by the designation of an area as industrial in a county development plan or a municipal master plan, among other means.

2. More stringent non-industrial residual contaminant levels for soil are not necessary to protect public health on or off the site or facility.

Note: Situations where a non-industrial classification would apply include site or facilities which could otherwise be classified as industrial, but where proximity to a non-industrial land use, such as residential housing located across the street, makes a non-industrial classification more appropriate.

(c) An industrial land use classification may be applied to restricted access areas unless more stringent residual contaminant levels are necessary to protect public health on or off the site.

Note: Under ch. NR 726, a continuing obligation will be imposed as part of the case closure letter if residual contaminant levels are based on industrial exposure or if a soil performance standard is used.

History: Cr. Register, March, 1995, No. 471, eff. 4-1-95; corrections in (1) (c) made under s. 13.93 (2m) (b) 7., Stats., Register September 2007 No. 621; **CR 12-023: cr. (1) (title), am. (1) (b), (c), cr. (2) (title), am. (2), cr. (3) (title), am. (3) (intro.), cr. (4), (5) Register October 2013 No. 694, eff. 11-1-13.**

NR 720.07 General requirements when establishing soil cleanup standards applicable to a site or facility.

(1) GENERAL. (a) Responsible parties shall use information from the sources listed in s. NR 720.05 (1) to determine the residual contaminant levels or performance standards for each exposure or migration pathway of concern for each soil contaminant of concern at a site or facility in accordance with this chapter.

(b) In addition to meeting the requirements of par. (c), responsible parties shall establish the soil cleanup standard for each soil contaminant of concern at the site or facility as one of the following:

1. The residual contaminant level of each contaminant in soil which is the lowest concentration from among the following as applicable: the ceiling limit concentration, the soil saturation concentration if the contaminant is a volatile, a land use specific direct contact level, a groundwater quality protective level, a concentration calculated for a pathway of concern set forth in s. NR 720.13 all of which are determined in accordance with the requirements of this chapter.

Note: For a single contaminant, a numeric land use specific residual contaminant level is determined based on aggregate exposure through incidental ingestion of soil,

inhalation of soil vapors and particulates, and dermal contact with soil. When more than one contaminant is present, the residual contaminant level is determined based on cumulative exposure and may have to be adjusted downward so that the cumulative risk does not exceed an excess cancer risk of 1-in-100,000 or a hazard index of 1 for non-carcinogens.

2. A performance standard determined in accordance with s. NR 720.08.

(c) In addition to meeting the requirements of par. (b), a soil cleanup standard developed under this chapter shall comply with all the following requirements:

1. Residual soil contamination at the site or facility may not adversely affect surface water.
2. Residual soil contamination at the site or facility may not adversely affect a sensitive environment.
3. Residual soil contamination at the site or facility may not concentrate through plant uptake and adversely affect the food chain.
4. Residual soil contamination at the site or facility may not result in vapor concentrations reaching a substance's lower explosive limit.

(2) COMPLIANCE WITH SOIL CLEANUP STANDARDS. (a) Contaminant concentrations in soil samples shall be determined using a department-approved and appropriate analytical method and reported on a dry weight basis. An appropriate analytical method shall have limits of detection or limits of quantitation, or both, at or below soil cleanup standards where possible. Responsible parties shall report the limit of detection and the limit of quantitation with sample results. The department may require that supporting documentation for the reported limit of detection and limit of quantitation be submitted

(b) Unless an alternative approach for determining standards exceedances is approved by the department, if a soil contaminant concentration in a sample exceeds the soil cleanup standard at or above the limit of quantitation for that soil contaminant, the soil cleanup standard shall be considered to have been exceeded.

Note: When evaluating the direct contact pathways, it may be possible to average measured soil sample concentrations to determine whether the calculated residual contaminant level has been exceeded or not. If averaging of soil concentrations is being considered, the department recommends seeking department approval of the proposed sampling plan and analysis methodology as soon as possible, but prior to submitting a case closure request in order to avoid delays and other potential problems.

Note: Averaging soil concentrations is not appropriate as the sole method for addressing sites with areas of significant soil contamination.

(c) If a soil cleanup standard for a soil contaminant is between the limit of detection and the limit of quantitation, the soil cleanup standard shall be considered to be exceeded if the soil contaminant concentration is reported at or above the limit of quantitation.

(d) The following applies when a soil cleanup standard for a soil contaminant is below the limit of detection:

1. If a soil contaminant is not detected in a sample, the soil cleanup standard shall not be considered to have been exceeded.
2. If a soil contaminant is reported above the limit of detection but below the limit of quantitation, the responsible party may accept the results and the soil cleanup standard shall be considered to have been exceeded, or the responsible party may choose to have the soil sample reanalyzed by the use of an appropriate analytical method. If the soil contaminant is confirmed to be present between the limit of detection and the limit of quantitation, the soil cleanup standard shall be considered to have been exceeded. If the soil contaminant is not detected upon reanalysis of the soil sample, the soil cleanup standard shall not be considered to have been exceeded.

(3) BACKGROUND. If the background concentration for a substance in soil at a site or facility is higher than the residual contaminant level for that substance determined using the procedures in this section, the background concentration in soil may be used as the residual contaminant level for that substance. The background concentration for a substance in soil shall be determined using a department-approved and appropriate method.

Note: Naturally occurring background concentrations of arsenic in soil, for example, may be higher than the calculated residual contaminant level for arsenic. In such

instances, the naturally occurring background concentration could be used as the soil cleanup level.

History: Cr. Register, March, 1995, No. 471, eff. 4-1-95; CR 12-023: am. (title), (1) (a) to (c), cr. (1) (c) 4., am. (2) (b), (d) 2., cr. (3) Register October 2013 No. 694, eff. 11-1-13.

NR 720.08 Procedures for establishing soil performance standards. (1) **GENERAL.** If a responsible party selects this option, performance standards shall be established and maintained so that the residual contaminants in the soil do not pose a threat to public health, safety, or welfare or the environment.

Note: Guidance document RR-528 indicates that it may not be necessary to determine numeric residual contaminant levels for contaminants as long as all contaminant pathways for all contaminants of concern are addressed by the remedial action, the extent of contamination is fully defined, the remedy remains in place, is maintained as appropriate and remains effective. For example, if a cover is placed that addresses all pathways for the contaminated soil, then it isn't necessary to determine the numeric residual contaminant levels for as long as the cover adequately addresses the pathway and remains protective. It may be necessary to determine residual contaminant levels in the future if the remedy is changed or replaced.

(2) **PROTECTION OF GROUNDWATER.** Acceptable performance standard options to address the soil to groundwater pathway may include any of, or any combination of, the following:

(a) Placement of a permanent engineering control such as a cap or cover to limit infiltration and thereby minimizing the leaching of soil contaminants to groundwater that is constructed and maintained until the threat to groundwater no longer exists.

(b) Use of natural attenuation to contain and remediate the contaminants present.

(c) Operation of a system in compliance with ch. NR 724 until the lowest concentration that is practicable is achieved.

Note: As explained in more detail in guidance document RR-528, if there is no threat to groundwater from soil contamination, a soil remedy is not necessary. The lack of groundwater contamination may not always be sufficient to establish there is not threat to the groundwater pathway. An analysis to determine whether sufficient time has passed for the soil contamination to have reached the locations where groundwater is being monitored may be necessary. The factors that may need to be considered include: the age of the contaminant release, type of contaminants, geologic setting, depth to groundwater, and the proximity of the monitoring wells to the source of contamination.

(3) **PROTECTION FROM DIRECT CONTACT.** Acceptable performance standard options to address the direct contact pathway may include either of, or a combination of, the following:

(a) Placement of a permanent engineering control such as a cap or cover that is constructed and maintained until the direct contact threat no longer exists.

(b) Operation of a system in compliance with ch. NR 724 until the lowest concentration that is practicable is achieved.

History: CR 12-023: cr. Register October 2013 No. 694, eff. 11-1-13.

NR 720.10 Procedures for determining residual contaminant levels based on protection of groundwater. (1) **GENERAL.** If a responsible party selects this option, residual contaminant levels for soil based on protection of groundwater shall be developed using the enforcement standards established in ch. NR 140 or using procedures consistent with the methodology in ss. 160.13 and 160.15, Stats., and the criteria in s. NR 722.09 (2) (b) 2. when there is no enforcement standard as the target concentrations in groundwater. If the department of health has not developed a recommended enforcement standard and a federal maximum contaminant level exists, that value may be used for calculating a soil residual contaminant level.

Note: In developing a residual contaminant level, any relevant information may be considered, including public welfare concerns for groundwater, such as taste and odor, and drinking water health advisory levels.

(2) **METHODS.** Responsible parties shall use one or more of the methods listed in this section based on scientifically valid procedures that are subject to department review and approval and site-specific geological, physical and chemical conditions to establish residual contaminant levels:

(a) A contaminant transport and fate model.

(b) Leaching tests appropriate for the site or facility in both application and extent.

(c) Any other appropriate method approved by the department for that specific site or facility, or other appropriate method suggested in department guidance.

Note: Guidance document RR-890 provides detailed instructions on one method the department considers scientifically valid for purposes of calculating site specific residual contaminant levels that are protective of groundwater quality. A table of residual contaminant levels that are calculated using the standard default exposure assumptions can be found at: <http://dnr.wi.gov/topic/Brownfields/professionals.html#tabx2>.

History: CR 12-023: cr. Register October 2013 No. 694, eff. 11-1-13.

NR 720.12 Procedures for determining residual contaminant levels based on protection of human health from direct contact with contaminated soil.

(1) **GENERAL.** If a responsible party selects this option, residual contaminant levels for soil based on protection of human health from direct contact shall be developed using the following criteria:

(a) For individual compounds using an excess cancer risk of 1×10^{-6} and a hazard quotient for non-carcinogens of one; and

(b) The cumulative excess cancer risk will not exceed 1×10^{-5} and the hazard index for non-carcinogens will not exceed one for the site or facility.

(c) Risks for carcinogens and hazard quotients for non-carcinogens are presumed to be additive within each category, unless there is specific information that demonstrates that an alternative approach is more appropriate.

(d) If toxicological values for both carcinogenic and non-carcinogenic end points exist for a substance, both shall be evaluated and the method that generates the lowest residual contaminant level shall be used for the site or facility.

(2) **METHODS AND PROCEDURES.** Responsible parties shall determine a residual contaminant level to protect public health from direct contact with soil contamination using scientifically valid procedures and toxicological values approved by the department and the default exposure assumptions identified in sub. (3) or alternative assumptions specifically approved by the department in writing.

Note: The department will generally consider toxicological values in the following order: U.S. EPA's Integrated Risk Information System (IRIS); U.S. EPA's Provisional Peer Reviewed Toxicity Values (PPRTV); Agency for Toxic Substances and Disease Registry (ATSDR); California EPA (Cal EPA); U.S. EPA's Health Effects Assessment Summary Tables (HEAST); other pertinent toxicological information.

(3) **DEFAULT EXPOSURE ASSUMPTIONS.** (a) *Non-carcinogens.* When the contaminant is not a carcinogen, the following default exposure assumptions shall be used:

1. When the land use of a site or facility is classified as non-industrial, in accordance with s. NR 720.05 (5), all of the following shall apply:

a. Incidental ingestion of soil shall be assumed to occur at the rate of 200 mg of soil per day for a 15 kg child for 350 days each year.

b. Dermal absorption of soil shall be determined assuming a child's daily exposed skin surface area of 2,800 cm² with a skin-soil adherence factor of 0.2 mg/cm² and a contaminant specific dermal absorption fraction.

c. Inhalation of outdoor soil vapors shall be assumed to occur for each volatile contaminant at a 24-hour daily exposure rate determined by the volatile's soil-to-air volatilization factor, and inhalation of particulate matter shall be determined assuming a particulate emission factor of 1.43×10^9 m³/kg.

d. An averaging period for exposure shall equal the default exposure duration of 6 years.

2. When the land use of a site or facility is classified as industrial, in accordance with s. NR 720.05 (5), all of the following shall apply:

a. Incidental ingestion of soil shall be assumed to occur at the rate of 100 mg of soil per day for a 70 kg adult worker for 250 days each year.

b. Dermal absorption of soil shall be determined assuming an adult outdoor worker's daily exposed skin surface of 3,300 cm²

with a skin–soil adherence factor of 0.2 mg/cm² and a contaminant specific dermal absorption fraction.

c. Inhalation of outdoor soil vapors shall be assumed to occur for each volatile contaminant at an 8–hour daily exposure rate determined by the volatile contaminant's soil–to–air volatilization factor, and inhalation of particulate matter shall be determined assuming a particulate emission factor of 1.43 x10⁹ m³/kg.

d. An averaging period of exposure shall equal the default exposure duration of 25 years.

(b) *Carcinogens*. When the contaminant is a carcinogen, the following default exposure assumptions shall be used:

1. When the land use of a site or facility is classified as non–industrial, in accordance with s. NR 720.05 (5), all of the following shall apply:

a. Incidental ingestion of soil shall be assumed to occur at the rate of 200 mg of soil per day for 350 days each year for 6 years for a 15 kg child and the rate of 100 mg per day for 350 days each year for 24 years for a 70 kg adult.

b. Dermal absorption of soil shall be determined assuming a child's daily exposed skin surface area of 2,800 cm² with a skin–soil adherence factor of 0.2 mg/cm², and an adult's daily exposed skin–surface area of 5,700 cm² with a skin–soil adherence factor of 0.07 mg/cm² and a contaminant specific dermal absorption fraction.

c. Inhalation of outdoor soil vapors shall be assumed to occur for each volatile contaminant at a 24–hr daily exposure rate determined by the volatile contaminant's soil–to–air volatilization factor, and inhalation of particulate matter shall be determined assuming a particulate emission factor of 1.43 x10⁹ m³/kg. For mutagenic contaminants, age segmented exposure durations shall be assumed when age adjusted cancer slope factors are available.

d. An averaging period of 30 years of exposure consisting of 6 child years and 24 adult years shall be assumed during a 70 year lifetime.

2. When the land use of a site or facility is classified as industrial, in accordance with s. NR 720.05 (5), all of the following shall apply:

a. Incidental ingestion of soil shall be assumed to occur at the rate of 100 mg of soil per day for 250 days each year for a 70 kg adult worker.

b. Dermal absorption of soil shall be determined assuming an adult outdoor worker's daily exposed skin surface of 3,300 cm² with a skin–soil adherence factor of 0.2 mg/cm² and a contaminant specific dermal absorption fraction.

c. Inhalation of outdoor soil vapors shall be assumed to occur for each volatile contaminant at an 8–hour daily exposure rate determined by the volatile contaminant's soil–to–air volatil-

ization factor, and inhalation of particulate matter shall be determined assuming a particulate emission factor of 1.43 x10⁹ m³/kg.

d. An averaging period of 25 years of exposure shall be assumed during a 70 year lifetime.

Note: EPA's regional screening level user's guide provides a table containing contaminant specific dermal absorption factors and soil to air volatilization factors. The document can be found at: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/usersguide.htm.

Note: Guidance document RR–890 provides detailed instructions on one method the department considers scientifically valid for purposes of calculating site specific residual contaminant levels that are protective of the direct contact pathway. A table of residual contaminant levels that are calculated using the standard default exposure assumptions can be found at: <http://dnr.wi.gov/topic/Brownfields/professionals.html#tabx2>.

(4) **SOIL PARAMETER VALUES**. Unless otherwise approved, when determining site specific residual contaminant levels, all the following soil parameter values shall be used:

(a) For direct contact:

1. A dry soil bulk density of 1.5 gm/cm³.
2. An air filled soil porosity of 0.28.
3. A total soil porosity of 0.43.
4. A water filled porosity of 0.15.
5. A soil particle density of 2.65 gm/cm³.
6. A soil organic carbon content of 0.006.

(b) For soil to groundwater:

1. A dry soil bulk density of 1.5 gm/cm³.
2. An air filled soil porosity of 0.13.
3. A total soil porosity of 0.43.
4. A water filled porosity of 0.30.
5. A soil particle density of 2.65 gm/cm³.
6. A soil organic carbon content of 0.002.

Note: These soil parameter values are the defaults used in Pub–RR–890, "Soil Residual Contaminant Level Determination Using the US EPA Regional Screening Level Web Calculator." This guidance may be found at <http://dnr.wi.gov/topic/Brownfields/Pubs.html>.

History: CR 12–023: cr. Register October 2013 No. 694, eff. 11–1–13.

NR 720.13 Other pathways of concern. Responsible parties shall consider human food chain, surface water quality, and terrestrial eco–system pathways of exposure, when those pathways of exposure are of concern at a site or facility.

Note: In some cases, the potential for contaminant migration or exposure to contamination through other pathways may be of concern at a site or facility. These situations could include contaminated soil in close proximity to a surface water where the potential for runoff from the site or facility to cause an impact on surface water quality exists or contaminated soil where potential for bioaccumulation and uptake through the food chain resulting in adverse impacts to human health or terrestrial ecosystems exists. This section requires responsible parties to establish appropriate residual contaminant levels protective of these pathways when necessary.

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